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ABSTRACT

This paper comments on three presentations (Janet Fisher, Malcolm Getz, and Bill Regier) at the Scholarly Communication and Technology Conference; it focuses on publisher costs, and also discusses the electronic publishing efforts undertaken at the University of Chicago Press. Janet Fisher, from MIT (Massachusetts Institute of Technology) Press, gave costs related to both the electronic journals that they are publishing and to two of MIT's print journals. First-copy costs (the cost for editing, typesetting, and producing materials that can subsequently be duplicated and distributed to several hundred or several thousand subscribers) for electronic journals at MIT Press range from approximately $15 to $56 per page; the total first-copy costs for the print journals are $22 and $24 per page. At this point, for the MIT Press, it is cheaper to produce journals in paper than to do them electronically, if the circulation is small. Malcolm Getz presented a breakdown of costs from the American Economic Association (AEA). A comparison of cost percentages for the University of Chicago Press and for the AEA reveals that overall, editorial, typesetting, and distribution costs are quite similar. Bill Regier reported that for Project Muse, the electronic publishing venture of Johns Hopkins University Press, the total costs for both print and electronic editions were about 130% of the print-only costs. The electronic publishing model under discussion is structured so that electronic costs are add-on costs to the traditional printing functions. A second model is described in which data are converted to SGML (Standardized Generalized Markup Language) form in the earliest stages of editing; then the SGML database is used to derive both the typeset output for hardcopy printing and the electronic materials for electronic dissemination. Six tables illustrate cost percentages and publishing models. (AEF)

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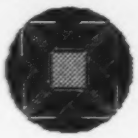

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Session #1 Economics of Electronic Publishing: Cost Issues

Economics of Electronic Publishing: Cost Issues - Comments on Session One Presentations

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I have a few brief comments on the very interesting and stimulating talks we've heard by Janet Fisher, Malcolm Getz, and Bill Regier. I'll focus on their presentations of publisher costs, and I'll add a few words about the electronic publishing efforts we have undertaken at the University of Chicago Press and contrast the model we have adopted with the ones that have been mentioned earlier.

Janet Fisher, from the MIT Press, gave us costs related both to the electronic journals that they are publishing and to two of MIT's print journals. In Table One I've reworked the numbers and computed "first-copy" costs on a per-page basis. What I mean by "first-copy cost" is simply the cost for editing, typesetting, and producing materials that can subsequently be duplicated and distributed to several hundred or several thousand subscribers. The total first-copy costs for electronic journals at MIT Press range from approximately $15 to $56 per page, and the total first-copy costs for the print journals are $22 and $24 per page. In computing these costs, I did

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not include what Janet labeled as the "G&A" costs, the general and administrative costs, but I did include the portion of the cost of the Digital Lab that is related to first-copy production.

There are several things here that I think are important and worth a comment or two. First, the Digital Lab cost, the cost of preparing an electronic edition after editing and typesetting, is a significant portion of the total . Although the percentage varies between 13% and 62% (as indicated in Table One), the cost is close to 50% of the total first-copy costs of publishing these particular electronic journals.

This breakdown raises the questions, Why are these costs so high? and Will they decline over time? I think the expense reflects the fact that there are hand-crafted aspects of electronic production, which are expensive, and there are substantial hardware costs that need to be allocated among a relatively small number of publications and a small number of pages. As for the future, the per-page costs at the Lab can be expected to go down as pages increase and new processing techniques are developed, but even if they do go down to 40%, the totals for the digital production are going to be a significant portion of the publisher's total cost. This is important.

Another point about these costs. Note that the total first-copy costs of the electronic journals average $40-$43 per page, and those for the print journals average about $23 per page, roughly a $20 difference in the costs. For a 200 page issue, that would amount to about $4,000. That is, it is $4,000 more expensive to produce materials for reproduction and distribution of 200 pages in electronic form than it is to produce materials for reproduction and distribution of 200 pages in hardcopy form.

If $4,000 will pay for printing and distribution of a 200-page issue to 500 subscribers, which is a reasonable estimate, then MIT can produce a print edition less expensively than an electronic edition when the distribution is under 500. That is an important conclusion: At this point, for the MIT Press, it's cheaper to produce journals in paper than to do them electronically, if the circulation is small. That may evolve over time, but right now, it's still cheaper to be in print until circulation rises to at least 500, because for small-circulation totals the additional costs of electronic processing are not offset by sufficiently large reductions in printing and distribution costs.

Now let me turn to the presentation by Malcolm Getz. Malcolm presented some numbers from the American Economic Association (AEA), and the numbers in Table Two are approximately the same as the ones he presented. I have also presented numbers from the University of Chicago Press for 37 of our titles. That is not the total of our serial publications - we publish 54 in all. It excludes *The Astrophysical Journal*, our largest single title, and a number of journals that we publish in cooperation with other not-for-profit organizations. The journals that are included are principally titles in the humanities and social sciences, with some in medicine and biology.

The breakdown of costs for the Press and for the AEA is quite similar. Editorial costs are 36% for AEA and 32% for the Press. Typesetting is 13% for AEA and 10% at the Press, though it varies substantially by journal. Distribution costs are similar. Overall, these numbers are very close, and they are, it seems to me, reasonable numbers industry-wide.

It is possible to provide a more detailed break-down of the numbers for the Press, and in Table Three I have broken down the 32% that is related to editorial into the portion that is related to

the peer review of manuscripts, which is 22% of the total, and the portion that is related to manuscript editing, which is 10% of the total. Because of the manner in which some of the Press's costs are recorded, the number I have shown for manuscript editing may be somewhat higher, but the breakdown between peer review and manuscript editing is a reasonably accurate division of costs in traditional journal publishing. I think this revised breakdown of costs provides an interesting context for reviewing the way in which costs evolve in an electronic publishing environment, and I would like to turn now to make a few remarks about the possibilities for cost restructuring and cost reduction.

The electronic publishing model we have been discussing this morning is structured so that, basically, electronic costs are add-on costs - you do everything you do in print, and then you do some more. I have outlined the process in Table Four. The process includes the traditional functions of peer review, manuscript editing, typesetting, printing and mailing, and adds new functions and new costs for the derivation of electronic materials from the typesetting process and for the management of electronic services.

In this model, for the vast majority of journals, as long as we continue to produce both print and electronic editions, the total cost is not going to decrease. The reason is that, even if a significant portion of the subscribers convert from paper to electronic editions, the additional costs for electronic processing are not offset by reductions in the printing and distribution costs. As we all know, the marginal cost of printing and mailing is small, much smaller than the average cost, and the additional costs for electronic processing are substantial. The consequence is that, in this model, electronic costs turn out to be added costs, costs in addition to the total that would exist if only a print edition were being produced.

This is exactly what we heard from Bill Regier. He reported that for Project Muse, the electronic publishing venture of the Johns Hopkins University Press, the total costs for both print and electronic editions were about 130% of the print-only costs. This is a significant increase, and I believe it is representative of efforts that are based on deriving electronic materials from typesetting files, as a separate stage of production, undertaken subsequent to the typesetting process.

I would now like to discuss another approach to electronic publishing, another way to obtain electronic materials and to do electronic dissemination. This process is quite different from the one I have just described, with different cost structures and different total costs. The process is outlined in Table Five. In this process, data are converted to SGML form in the earliest stages of editing. Then the SGML database is used to derive both the typeset output for hardcopy printing and the electronic materials for electronic dissemination.

This process generates costs quite different than those for the model we looked at before. The costs are summarized in Table Six. Most important, there is a substantial increase in the cost at the beginning of the process, in the conversion of data to SGML form and the editing of it in that format. SGML editing is not easy and it is not cheap. However, because manuscripts are extensively marked up and formatted in this process, a typeset version can be derived from the SGML database inexpensively, and of course, the electronic files for distribution in electronic form are also straightforward and inexpensive to derive. Overall, the additional costs for conversion and editing are being offset in large part by reductions in typesetting costs.

This is the process that we have undertaken with *The Astrophysical Journal* at the University of Chicago Press and are now implementing for other publications. *The Astrophysical Journal*,

sponsored by the American Astronomical Society, is the world's leading publication in astronomy, issuing some 25,000 pages each year, in both print and online editions. The conclusions we have reached in our efforts for that journal are that a reduction in the typesetting costs can offset other additional costs, and that this method of producing the journal is less expensive than any alternative way of generating the electronic materials that we want to obtain for the online edition.

These general conclusions are probably applicable to most scientific and technical journals, as this method - based on processing in SGML form - results in substantial reductions in the cost of typesetting tabular and mathematical matter. For those publications, we will be able to produce electronic editions for at most 10% more than the cost of producing print editions alone. In some cases it may be possible to produce electronic versions, in addition to the print versions, at no additional total cost.

Let me add one other point. Because we are converting manuscripts to SGML immediately and editing in SGML, we can obtain materials for electronic distribution much faster than in the traditional print model. Later this year we will publish papers in the online edition of *The Astrophysical Journal Letters* 14 days after after acceptance by the editor. That is possible because we will obtain the electronic version immediately from our SGML database and not derive it by post-processing of typesetting files.

In sum, with this process, in certain circumstances, we will be able to publish complex scientific material in a sophisticated electronic version both less expensively and more rapidly than by employing alternative means. This sort of processing is an important alternative approach to electronic publishing.

Table One

MIT Press First-copy Cost per Page

	Electronic Journals			
	JFLP	SNDE	CJTCS	JCN
MS Editing		7.25	4.57	
Composition		18.20	8.48	
Subtotal	7.87	25.44	13.05	49.00
Lab	7.68	18.42	21.31	7.00
Total	15.55	43.86	34.35	56.00
Lab %	49%	42%	62%	13%

	Print Journals	
	NC	COSY
MS Editing	6.46	6.93
Composition	16.04	17.57
Subtotal	22.50	24.50
Lab		
Total	22.50	24.50

Table Two

Cost Breakdown by Percentage for

AEA (3 journals) and University of Chicago Press (37 journals)

	AEA	Press
Editorial	36%	32%
Typeset	13%	10% (to 18%)
Print and Mail	23%	24%
Other	27%	34%

Table Three

Cost Breakdown by Percentage for

University of Chicago Press (37 journals)

Editorial	
Peer Review	22%
MS Edit	10%
Typeset	10% (to 18%)
Print and Mail	24%
Other	34%

Table Four

Cost Breakdown for Electronic Publishing Model One

Editorial		
Peer Review	22%	
MS Edit	10%	
Typeset	10% - 18%	
Derive e-materials		New Cost
Print and Mail	24%	
Other	34%	
Manage e-services		New Cost

Table Five

Process Analysis for Electronic Publishing Model Two

Editorial

Peer Review

Data conversion to SGML

MS Edit in SGML

Derive e-materials from SGML

Typeset from SGML

Print and Mail

Other

Manage e-services

Table Six

Cost Analysis for Electronic Publishing Model Two

Editorial	
Peer Review	
Data conversion to SGML	*Additional Cost*
MS Edit in SGML	*Additional Cost*
Derive e-materials from SGML	*New Cost, less than Model One*
Typeset from SGML	*Reduced Cost*
Print and Mail	
Other	
Manage e-services	*New Cost*

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For additional information about the conference, or The Andrew W. Mellon Foundation's scholarly communication initiatives, please contact Richard Ekman. For additional information about ARL or this web site contact Patricia Brennan, ARL Program Officer at (202) 296-2296.

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